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EXAMINER	
DAGER, JONATHAN M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/573,410	Applicant(s) BITAR ET AL.	
	Examiner JONATHAN M. DAGER	Art Unit 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 28 April 2008.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-11 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-11 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 26 December 2007.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant’s arguments, see pages 6-8, filed 28 April 2008, with respect to the rejection of claim 1 under 35 U.S.C. 103(a), have been fully considered and are persuasive due to amendment.. The rejection of claim 1 under 35 U.S.C. 103(a) has been withdrawn.

Applicant's arguments with respect to base claims 2-11 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-4, and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran (US 5,892,462), and further in view of Zoraster (US 5,839,090).

Regarding claims 1-3, and 6-9, Tran has disclosed a ground collision avoidance system that exhibits improved accuracy and performance by integrating with all other aircraft systems including guidance systems, navigation systems, digital terrain elevation databases, mission computers, and radar altimeters. The ground collision avoidance system fully utilizes active onboard sensors in combination with the knowledge of terrain and obstacle data contained in databases. Furthermore, the ground collision avoidance system provides a multiple processing path to determine

numerous predicted flight paths based on a number of reasonable assumptions regarding the aircraft flight during a predetermined amount of time. By using predictive flight path schemes a realistic estimate of the predicted flight path envelope can be determined and then this information can be used in conjunction with accurate terrain elevation databases to determine whether a ground collision condition exists. On the basis of these calculations, appropriate warnings can be provided to the air crew as well as suggested maneuvers to avoid ground collision (abstract).

Further, Tran discloses that an adaptive ground collision avoidance system that employs a continuously-updated digital terrain elevation database in order to provide an accurate analysis of the terrain over which an aircraft is flying. This local terrain awareness system incorporates a digital terrain elevation database along with inputs from active terrain sensors, radar altimeter, as well as the inertial navigation system. The combination of these elements provides an accurate depiction of the terrain directly under and along the flight path of the aircraft. Because the database is continually updated by the radar altimeter and other active sensors, the accuracy of the database is not of a concern because it is continually augmented. By augmenting the information already contained in the database, a more accurate picture over a large area of the terrain over which the aircraft is flying can be generated. The accuracy of the terrain model does not change as the aircraft moves away or closer to the aircraft, because the model is continuously updated due to the inputs of the active sensors. Additionally, the database is able to account for newly-erected structures on the ground, which may have been erected since the database was constructed. The ground collision avoidance

system provides numerous predicted flight paths for the aircraft based on a reasonable number of assumptions regarding the aircraft flight during a predetermined amount of time. Initially, a first flight path is determined for the aircraft as it flies along its current route. A second/recommended route is calculated for the aircraft that would allow the aircraft to avoid any obstacle along the first path with which the aircraft would otherwise collide. Instead of the ground collision avoidance detector being a mere proximity detector to terrain which can be collided with, it instead allows the aircraft to realize that it has an exit route, and the collision warning notification is then not given until the absolute last minute. The recommended route is provided to the pilot as an automatic guidance feature. As soon as it is determined that the escape route is to disappear, the ground collision warning is then made and a proposed course of escape is provided to the pilot (column 2 lines 25-65).

Thus, Tran has provided an anti-collision which estimates a distance to a known point on a map, the point being realized from a continuously updated terrain elevation database comprising position (GPS, see column 2 lines 13-24) and altitude data. Based on the distance to the target of the aircraft (column 6 lines 14-42), and predicted collision ETA, the aircraft provides the safest route that would keep the aircraft from the prohibited zone of travel.

Tran does not explicitly disclose using the distance estimation method, as claimed.

3. Zoraster teaches a transform gridding method using distance, in which high quality geologic interpretations are incorporated onto computer generated contours. The

method starts with a trend form grid on which characteristics of geological formations are superimposed. Contours of such characteristics with respect to the trend form grid are generated using a distance transformation (abstract).

Further, Zoraster teaches distance transforms in image processing via application of a mask over various points in an image, and then estimation of a distance to a point, from using well established methods, including the known works of Borgefors (column 1 lines 26-67, and column 2 lines 1-30)

In the current application, the applicant has provided in the specification multiple citations on well known methods of distance transformations on displayed images.

For example, as stated in paragraphs 0005 and 0006 of Applicant's published specification:

“Distance transforms operating by propagation also known as "chamfer distance transforms" or "chamfer Euclidean distance transforms" deduce the distance of a pixel termed the goal pixel with respect to another pixel termed the source pixel, from the distances previously estimated for the pixels of its neighborhood, through a scan of the pixels of the image. The scan makes it possible to estimate the distance of a new goal pixel with respect to the source pixel by searching for the path of minimum length going from the new goal pixel to the source pixel passing through an intermediate pixel of its neighborhood whose distance has already been estimated, the distance of the new goal pixel to an intermediate pixel of its neighborhood whose distance has already been estimated being given by applying a neighborhood mask commonly called a chamfer mask.
A distance transform of this kind was proposed in 1986 by Gunilla Borgefors for estimating distances between objects in a digital image, in an article entitled: "Distance Transformation in Digital Images" and published in the journal "Computer Vision, Graphics and Image Processing", Vol. 34 pp. 344-378. One of the interesting benefits of these propagation-based distance transforms is of reducing the complexity of the calculations of a distance estimate by permitting the use of integers.”

Further, paragraph 0007 of the published specification reads:

“To select the path of minimum length giving the distance estimate, a propagation-based distance transform must test all the possible paths. This obligation is manifested as a regularity constraint imposed on the order of scanning of the pixels of an image. G. Borgefors proposes, in order to satisfy this regularity constraint, that the pixels of an image be scanned twice consecutively, in two mutually inverse orders, which are either lexicographic order, the image being analyzed from left to right row by row and from top to bottom, and inverse lexicographic order, or transposed lexicographic order, the image having undergone a 90.degree. rotation, and inverse transposed lexicographic order. She also proposes the adoption of a chamfer mask of dimensions 3.times.3 with two values (3, 4) of neighborhood distances or of dimensions 5.times.5 with three values (5, 7, 11) of neighborhood distances.”

Paragraph 0043, last line, affirms the above:

“G. Borgefors advocates a double scan of the pixels of the image, once in lexicographic order and another time in inverse lexicographic order.”

The above citations can additionally be applied to claims 2, 3, and 6-11.

The specification further adds (para 0047),

“For terrain navigation of mobile objects such as robots, the propagation-based distance transform is used to estimate the distances of the points of the changing terrain map extracted from a database of elevation of the terrain with respect to the position of the mobile object or a close position. In this case, it is known to take account of static constraints consisting of map zones that the mobile object cannot cross on account of their undulating configurations.”

Tran has provided a terrain awareness system and method to be utilized in aircraft, but is deficient, with respect to the current application, in that Tran does not explicitly disclose using the image processing methods as claimed. Zoraster, however, cures this deficiency by teaching distance transformations in terrain navigation via citing many well known methods utilized in image processing.

Thus, it would be obvious to one of ordinary skill in the art at the time of the invention to simply substitute the image processing in terrain navigations methods into the base device of Tran. Doing so would provide no more than the predictable result of

a more accurate method of providing distance from a mobile vehicle to a known terrain obstacle.

4. Simple substitution of one known element for another to obtain predictable results will support a conclusion of obviousness. See MPEP 2143 (B).

Regarding claim 4, Tran discloses that the flight envelope prediction system 50 coordinates with the flight control computers 35, mission computer 24 and the inertial navigation systems 28 to provide one or more predicted flight envelopes within which the aircraft will be traveling during a predetermined period. Flight envelope prediction system 50 calculates a number of reasonable flight envelopes based on the extended current flight trajectory and the possible maneuvers that a pilot is likely to carry out. Flight envelope prediction system 50 also operates with the high fidelity aircraft model 39 (including flight control and guidance models) to accurately predict the possible maneuvering capabilities of the aircraft.

Ground correlation system 60 utilizes the information provided by localized terrain awareness system 40 and flight envelope prediction system 50 to ground map the aircraft's flight. This ground mapping is accomplished by projecting the possible flight paths upon the correlated terrain and feature image over which the aircraft is flying. From this ground correlation a warning situation can be detected wherein it is determined that ground collision is imminent if no further corrective action is taken (column 5 lines 33-55).

Thus, Tran discloses that the method includes forecasting aircraft position with the flight plan, and that if the deviation between a minimum safe altitude and an object is beyond an unacceptable threshold, detecting a warning situation.

Regarding claim 10, Tran, as modified above by Zoraster, combined with the well known work of Borgefors, teaches all eight scanning techniques (taken from current application, para 0007):

"…the scanning of the image pixels the image being analyzed from left to right row by row and from top to bottom, and inverse lexicographic order, or transposed lexicographic order, the image having undergone a 90.degree. rotation, and inverse transposed lexicographic order. She also proposes the adoption of a chamfer mask of dimensions 3.times.3 with two values (3, 4) of neighborhood distances or of dimensions 5.times.5 with three values (5, 7, 11) of neighborhood distances."

Thus, it would have been obvious to one of ordinary skill in the art of the invention to utilize the image possessing techniques as taught by Zoraster in the device of Tran. Doing so would no more than yield the predictable result of distance stabilization via multiple scanning techniques.

5. Combining prior art elements according to known methods to yield predictable results is a rationale to support a conclusion of obviousness. See MPEP 2143(a).

6. Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Tran (US 5,892,462) and Zoraster (US 5,839,090), as applied to claims 1-4 above, and further in view of Margolin (US 6,177,943)

Regarding claims 5 and 11, Tran discloses that a ground collision warning generator 80 provides the necessary warnings and displays to the pilot and air crew to alert them to possible ground collision and provides them with the visualized vertical terrain profile and, predicted flight path, and highlighted collision point (see FIGS. 2 and 5 for ground collision point as represented on the terrain scanning profile). Ground collision warning generator 80 has attached thereto audio warnings system 82 and a ground collision warning display 84. Audio warnings system 82 provides audible warnings to the pilot such as buzzers or possible "fly out" cueing commands. The buzzers can be variable frequency tone and distinctive voice advisories and warnings for various/different ground proximity, ground collision, and ground avoidance situations. Similarly, ground collision warning display 84 can display the possible collision situations to the pilot as well as display the necessary evasive maneuvers to assist the pilot in avoiding ground collision (column 5 lines 63-67, column 6 lines 1-14). While this suggests that when the deviations of the aircraft, with respect to the ground, go beyond a threshold display means can provide a visual indication on a map, it still does not explicitly anticipate that which is claimed. Further, Tran, as modified by Zoraster, does not teach scanning the image pixels in a diagonal order.

7. Margolin, however, teaches that to prevent a polygon from blending in with its neighbors in a system with a limited number of bits per pixel, polygons can be drawn so that its edges are a different color or shade from its interior (column 9 lines 66-67, column 10 lines 1-2).

Further, Margolin teaches scanning saved terrain images in successive patterns, including a diagonal order (column 2 lines 61-67, column 3 lines 1-11).

All of the components and methods are known in the above prior art. The only difference is a combination of these elements into a single device.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the use of color strata function of Margolin onto the combination of Tran and Zoraster, since all systems could be used in combination to produce the predictable result of displaying terrain deviation data via the use of color, as well as a diagonal method of scanning an image diagonally to obtain greater distance estimate stabilization.

8. Combining prior art elements according to known methods to yield predictable results is a rationale to support a conclusion of obviousness. See MPEP 2143(a).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN M. DAGER whose telephone number is (571)270-1332. The examiner can normally be reached on 0830-1800 (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jonathan M Dager/
Examiner, Art Unit 3663
21 July 2008

/Thomas G. Black/
Supervisory Patent Examiner, Art Unit 3661